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EXAMINER	
FIORITO, JAMES	
ART UNIT	**PAPER NUMBER**
1763	

DATE MAILED: 12/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/702,368	DIVERGILIO ET AL.	
	Examiner	Art Unit	
	James A. Fiorito	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 November 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-29* is/are pending in the application.

4a) Of the above claim(s) *1-12 and 26-29* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *13-25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ Claim(s) *1-29* are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *06 November 2003*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

This application contains claims directed to the following patentably distinct species of the claimed invention:

Species 1 – Antenna, Claims 1-12;

Species 2 – Ion shower, Claims 13-25;

Species 3 – Detailed grounding rods in an ion shower, Claims 13, 26-28;

Species 4 – Detailed extraction assembly in an ion shower, Claims 13, 29.

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, Species 2 is generic to Claim 13.

Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise include all the limitations of an allowed generic claim as provided by 37 CFR 1.141. If claims

are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

During a telephone conversation with Thomas G. Eschweiler on 12-5-2005 a provisional election was made without traverse to prosecute the invention of Species 2, claims 13-25. Affirmation of this election must be made by applicant in replying to this Office action. Claims 1-12, and 26-29 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 19 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 19, the phrase "type" renders the claim indefinite because it is unclear whether the limitation(s) following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 13-18, and 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Leung (US 6,888,146) in view of Moslehi (US 2001/0047760).

With respect to Claim 13: Leung discloses an ion shower system (Fig. 3), comprising a plasma source operable to generate source gas ions within a chamber (Fig. 3, Item 13, Column 3 Lines 1-2), an extraction assembly associated with the chamber, and operable to extract source gas ions therefrom (Fig. 3 Item 14, Column 3 Lines 43-44).

Leung does not expressly state the plasma source further comprises: a plurality of conductor segments; a plurality of capacitors, wherein the conductor segments are serially connected through the plurality of capacitors; an antenna drive circuit coupled to

the plurality of conductor segments, and operable to provide power to the conductor segments and capacitors at a predetermined frequency; and a source gas inlet, wherein the source gas inlet is operable to provide a source gas to the chamber, and wherein the conductor segments, capacitors and antenna drive circuit cooperatively provide energy to charged particles in the chamber, thereby energizing the charged particles and generating a plasma comprising source gas ions and electrons within the chamber due to ionizing collisions between the energized charged particles and the source gas.

Moslehi discloses an ion shower system (Fig. 22) wherein the plasma source further comprises: a plurality of conductor segments (Fig. 2 Items 186,190, and 196, Paragraph 57 Lines 9-12); a plurality of capacitors (Fig. 3 Items 224 and 227, Paragraph 57 Lines 16-23), wherein the conductor segments are serially connected through the plurality of capacitors (Paragraph 57 Lines 19-22); an antenna drive circuit coupled to the plurality of conductor segments (Paragraph 57 Lines 22-23), and operable to provide power to the conductor segments and capacitors at a predetermined frequency (Paragraph 113 Lines 10-17); and a source gas inlet (Fig. 22 Item 635), wherein the source gas inlet is operable to provide a source gas to the chamber (Fig. 22 Item 635), and wherein the conductor segments, capacitors and antenna drive circuit cooperatively provide energy to charged particles in the chamber, thereby energizing the charged particles and generating a plasma comprising source gas ions and electrons within the chamber due to ionizing collisions between the energized charged particles and the source gas (Fig. 22). Leung and Moslehi are

analogous art because they are from the same field of endeavor, namely semiconductor processing systems.

At the time of invention, it would have been obvious to a person of ordinary skill in the art to form Leung's ion shower including a plasma source further comprises: a plurality of conductor segments; a plurality of capacitors, wherein the conductor segments are serially connected through the plurality of capacitors; an antenna drive circuit coupled to the plurality of conductor segments, and operable to provide power to the conductor segments and capacitors at a predetermined frequency; and a source gas inlet, wherein the source gas inlet is operable to provide a source gas to the chamber, and wherein the conductor segments, capacitors and antenna drive circuit cooperatively provide energy to charged particles in the chamber, thereby energizing the charged particles and generating a plasma comprising source gas ions and electrons within the chamber due to ionizing collisions between the energized charged particles and the source gas in view of the teaching of Moslehi. The suggestion or motivation for doing so would have been to provide a plasma source and gas inlet to the ion shower system of Leung as required but not disclosed. Further motivation would have been to provide a multi-zone high-density plasma source structure using at least two individually controlled coil segments for uniform plasma processing (Paragraph 13 Lines 2-4) as taught by Moslehi. Even though motivation is provided in this case, the substitution of equivalents requires no express motivation. *In re* Fount, 213 USPQ 532 (CCPA 1982); *In re Siebentritt* 152, USPQ (CCPA 1967). Therefore, it would have been obvious to combine Leung with Moslehi to obtain the invention specified in Claim 13.

With respect to Claim 14: Leung discloses an Ion shower further comprising a workpiece support structure associated with the chamber (Fig. 3 Item 30), and operable to secure the workpiece for implantation thereof of source gas ions from the extraction assembly (Fig. 3 Item 30).

With respect to Claim 15: Moslehi discloses a plasma source wherein the first and last conductor segments of the plurality of conductor segments form an input (Fig. 2 Items 222 and 234), and wherein the antenna drive circuit is coupled to the input (Paragraph 57 Lines 22-23).

With respect to Claim 16: Moslehi discloses an ion shower, wherein the conductor segments have an inductive reactance associated therewith, and wherein the capacitors have a capacitive reactance associated therewith, and wherein one of the conductors and one of the capacitors form an antenna segment (Fig. 2 Items 186, and 224), wherein the inductive reactance and capacitive reactance of the antenna segment are equal at the predetermined frequency (Paragraph 113 Lines 13-17).

With respect to Claim 17: Moslehi discloses an ion shower, wherein the plurality of conductor segments and plurality of capacitors form a resonant circuit at the predetermined frequency (Paragraph 113 Lines 13-17).

With respect to Claim 18: Moslehi discloses an ion shower, wherein the antenna drive circuit comprises an oscillator circuit (Fig. 22 Items 608, 609, and 610; Paragraph 113 Lines 13-17).

With respect to Claim 20: Moslehi discloses an ion shower, wherein the plurality of conductor segments and capacitors are arranged within the chamber in an

azimuthally symmetric fashion, wherein a non-uniform capacitive electrostatic field component along each conductor segment is repeated in an azimuthally symmetric fashion (Fig. 2 Items 186, 190, and 194).

With respect to Claim 21: Leung discloses an ion shower, wherein the extraction assembly is associated with a top portion of the chamber, and is operable to extract ions vertically from the top portion thereof (Fig. 3 Item 14, Column 3 Lines 43-44).

With respect to Claim 22: Leung discloses an ion shower further comprising a workpiece support structure associated with the top portion of the chamber, and operable to secure the workpiece having an implantation surface orientated facing downward toward the extraction assembly for implantation thereof (Fig. 3 Item 30; Column 2 Lines 58-60).

Claims 13, and 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Collins (US 6,068,784) in view of Moslehi (US 2001/0047760).

With respect to Claim 13: Collins discloses an ion shower system (Fig. 1 Item 10), comprising a plasma source operable to generate source gas ions within a chamber (Fig. 1, Item 10, Column 6 Lines 62-68), a source gas inlet (Fig. 2 Item 56, Column 10 Lines 5-6), and an extraction assembly associated with the chamber, and operable to extract source gas ions therefrom (Column 8 Lines 58-60).

Collins does not expressly state the plasma source further comprises: a plurality of conductor segments; a plurality of capacitors, wherein the conductor segments are serially connected through the plurality of capacitors; an antenna drive circuit coupled to

the plurality of conductor segments, and operable to provide power to the conductor segments and capacitors at a predetermined frequency; and a source gas inlet, wherein the source gas inlet is operable to provide a source gas to the chamber, and wherein the conductor segments, capacitors and antenna drive circuit cooperatively provide energy to charged particles in the chamber, thereby energizing the charged particles and generating a plasma comprising source gas ions and electrons within the chamber due to ionizing collisions between the energized charged particles and the source gas.

Moslehi discloses an ion shower system (Fig. 22) wherein the plasma source further comprises: a plurality of conductor segments (Fig. 2 Items 186,190, and 196, Paragraph 57 Lines 9-12); a plurality of capacitors (Fig. 3 Items 224 and 227, Paragraph 57 Lines 16-23), wherein the conductor segments are serially connected through the plurality of capacitors (Paragraph 57 Lines 19-22); an antenna drive circuit coupled to the plurality of conductor segments (Paragraph 57 Lines 22-23), and operable to provide power to the conductor segments and capacitors at a predetermined frequency (Paragraph 113 Lines 10-17); and a source gas inlet (Fig. 22 Item 635), wherein the source gas inlet is operable to provide a source gas to the chamber (Fig. 22 Item 635), and wherein the conductor segments, capacitors and antenna drive circuit cooperatively provide energy to charged particles in the chamber, thereby energizing the charged particles and generating a plasma comprising source gas ions and electrons within the chamber due to ionizing collisions between the energized charged particles and the source gas (Fig. 22). Collins and Moslehi are

analogous art because they are from the same field of endeavor, namely semiconductor processing systems.

At the time of invention, it would have been obvious to a person of ordinary skill in the art to form Collins's ion shower including a plasma source further comprises: a plurality of conductor segments; a plurality of capacitors, wherein the conductor segments are serially connected through the plurality of capacitors; an antenna drive circuit coupled to the plurality of conductor segments, and operable to provide power to the conductor segments and capacitors at a predetermined frequency; wherein the source gas inlet is operable to provide a source gas to the chamber, and wherein the conductor segments, capacitors and antenna drive circuit cooperatively provide energy to charged particles in the chamber, thereby energizing the charged particles and generating a plasma comprising source gas ions and electrons within the chamber due to ionizing collisions between the energized charged particles and the source gas in view of the teaching of Moslehi. The suggestion or motivation for doing so would have been to provide a multi-zone high-density plasma source structure using at least two individually controlled coil segments for uniform plasma processing (Paragraph 13 Lines 2-4). Even though motivation is provided in this case, the substitution of equivalents requires no express motivation. *In re* Fount, 213 USPQ 532 (CCPA 1982); *In re Siebentritt* 152, USPQ (CCPA 1967). Therefore, it would have been obvious to combine Collins with Moslehi to obtain the invention specified in Claim 13.

With respect to Claim 23: Collins discloses an ion shower, wherein the chamber further comprises a bottom portion and side portions (Fig. 13 Item 77; Column 15 Lines

56-57), and wherein the side portions comprise a plurality of multi-cusp magnet devices operable to produce multi-cusp magnetic fields thereat to facilitate an azimuthal uniformity of plasma within the chamber (Fig. 13 Item 77; Column 15 Lines 56-57).

With respect to Claim 24: Collins discloses an ion shower, wherein the multi-cusp magnet devices comprise electromagnets operable to provide a variation in multi-cusp magnetic field strength at differing positions along the side portions (Fig. 3 Item 47; Column 9 Lines 10-15).

With respect to Claim 25: Collins discloses an ion shower, wherein the electromagnets are independently controllable, thereby facilitating a tuning of the multi-cusp magnetic fields (Column 17 Lines 8-12).

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Leung (US 6,888,146) in view of Moslehi (US 2001/0047760) as applied to claim 13 above, and further in view of Markunas (US 6,552,295).

With respect to Claim 19: Leung in view of Moslehi discloses an ion shower in accordance with claim 18.

Leung in view of Moslehi does not expressly state the oscillator circuit comprises a push-pull type oscillator circuit.

Markunas discloses an oscillator circuit comprising a push-pull type oscillator circuit. Leung, Moslehi and Markunas are analogous art because they are from the same field of endeavor, namely systems that use RF oscillator circuits.

At the time of invention it would have been obvious to a person of ordinary skill in the art to form the ion shower of Leung in view of Moslehi to include an oscillator circuit comprising a push-pull oscillator circuit in view of the teaching of Markunas. The suggestion or motivation for doing so would have been to provide a oscillator circuit to the ion shower system of Leung in view of Moslehi as required but not disclosed. Therefore, it would have been obvious to combine Leung in view of Moslehi with Markunas to obtain the invention specified in Claim 19.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Leung (US 6,768,120) teaches a focused electron and ion beam systems. McIntyre, Jr. (US 5,218,210) teaches a broad beam flux density control. Ishizaki (GB 2 308 745) teaches an antenna of capacitors and conductors in series.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James A. Fiorito whose telephone number is (571)272-7426. The examiner can normally be reached on Standard.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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